

## **EXHIBIT 49**



Lockwood, Andrews  
& Newnam, Inc.  
A TLO A DAY COMPANY

SUBJECT:

## DESIGN NOTES AND COMPUTATIONS

SHEET NO.

OF

8/21/13 Flint WTP MTE.

D.S. can we get by item 1 of 20 days storage vs. 30  
P.C. 20/30 days, they don't care, more concerned about delivery,  
ozone effectiveness & CT

4/1 JWB. has ozone report/pilot study -  
no CT credit  
Reduces  $Cl_2$  demand, reduce generation of THMs.  
- thought up lake water, we could get CT credit, but  
no perf. study done because lake water was not available.  
- Proposing to use mid pot ~~ozone~~ chlorination for CT

P.C. thinks MDEQ would approve CT credit for Great Lakes H<sub>2</sub>O.  
Bioss/Lypton for ozone.

They have mid pot & end pot sampling points, but no monitors. Piping is  
free to add.

S.B. wondering if ozone credit better option than transfer p.s.?

M.P. can some CT #'s @ 12 mgd & 18 mgd  
baffling factor - 0.28  
thought there was enough CT credit through 3 mgd storage -  
@ high pH & low water temp.

- 0.4 M storage. MDEQ would still want redundancy.  
currently have 18-19 days. Have to look @ delivery truck

MDEQ confirms we don't need Dost to get CT credit.

P.C. recommends calc'g CT #'s & giving range of operation &  
giving that info to City WTP staff.

M.P. wants monitoring pt. after ~~stage~~ 1 is ozone for more CT credit  
P.C. - get more credit for counter current flow vs. current flow.

EXHIBIT

GREEN - 36

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DATE

CHECKED BY

DATE

PROJECT NUMBER

D-004

LAN\_GCPO\_00036324

CONTAINS CONFIDENTIAL INFORMATION  
NOT TO BE DISCLOSED UNDER FOIA.  
RESPONSE TO GCPO SUBPOENA.

EXHIBIT

Hansen 8

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Coag. feed - place holder in case we need different coag for lake H<sub>2</sub>O  
 G.C. doing some investigation there

#2

Concept: 2 supplies, no back-up generator.

P.C. thought '04 recent area wide black-out. Wondered about generator.

W.G. full MTP load - 3.4 MVA. Can look at 1 gen or 2 gen.

vs. full rebuild of substation.

S.B. could use generator to offset peak charges from C.E.

#3

at - we already covered up Port under the

#4

no comment

#5

H.S. pumps oversized. VFD's & ventilation.

#6

out.

#7

includes expansion to monitor plus replacement of outdated PLC's.

#8

New connection to feed KWA H<sub>2</sub>O

M.P. just wanted to confirm cut/cap of downstream, unused TC.  
 or removed spool piece - A physical break.

- w/out filter transfer etc. - how to transition from Flint River to KWA supply?

#3 a)

Bray Rd. option for short term. DEQ said no. until Flint addresses corrective action that has been defined by DEQ. Solid waste.

Brant has that

- possible use old settling basins @ plant 1 - dewater, & leave in basins.

- temp plate presses. Co. in Pennsylv.

- S.B. / P.C. - said can't just leave sludge there - Need to dispose somehow.

- condition unknown. S.B. - they think we need all to Bray Rd.



## Proposed Scope of Upgrades to Flint WTP

### 1. Introduction

The City of Flint plans to utilize their existing WTP to provide water on a continuous basis. The city plans to treat water from the Flint River until construction of the proposed KWA supply is complete and the WTP can then be used to treat water from Lake Huron. An evaluation of the WTP to provide treatment of water from both sources is in process to define the scope of upgrades needed to provide reliable service. In addition to the different treatment requirements of each source, the WTP has not been operated on a continuous basis for 40+ years so facilities are also being evaluated to identify equipment which should be replaced because of its age, condition, or obsolescence.

### 2. Preliminary Scope of Work

Based on the WTP evaluation, the following scope of proposed upgrades has been developed. This summary is preliminary, provided for review and comment by interested parties. Comments received will be used to finalize the scope of work to be implemented at the Flint WTP.

The proposed upgrades have been categorized into two phases. Phase 1 is work that will be completed as soon as practical so that the WTP can be utilized to treat water from the river in 2014. Phase 2 work is needed to provide long-term service with the proposed KWA Lake Huron water source. Phase 2 work will be completed in 2015 to 2016.

Work is proposed to be contracted except where noted "by city" the work is planned to be completed by City staff.

#### Item 1 - Chemical Systems / Ozone

Additional storage of nitrogen and oxygen will be provided for redundancy and 30 day capacity.

Existing ozone units will be serviced to prepare for continuous operation.

New alternative coagulant chemical feed system will be added for treatment of raw water from Lake Huron.

Phase 1	Phase 2
Oxygen and nitrogen storage	New coagulant feed system
Service existing ozone system (by city)	

Preliminary – For Review and Comment JWG

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Item 2 – Electrical

The WTP presently uses 2400V as primary power. Power feeders and switchgear are rated at 5kV. Upgrading the primary power to 4160V will enable existing power feeders to provide twice the power and eliminate the need to install new feeder circuits throughout the WTP.

The current substation has two 2.5 MVA transformers running in parallel for a total capacity of 5 MVA. The transformers are obsolete. It is planned that the transformers and conductors to the WTP will be replaced to provide two independent power sources for redundancy. The existing on-site backup power generators are obsolete and inoperable. Since two independent power sources will be provided to the WTP, replacement of the generators is not proposed.

Electrical switch gear and equipment at Pump Station 4 will be replaced.

If filter presses (or other equipment) are utilized for dewatering of softening sludge, a new power feed will be required to the equipment.

Electrical switch gear and equipment at Plant 2 will be replaced.

Phase 1	Phase 2
Upgrade existing substation and power supply	Upgrade power system at Plant 2
Upgrade facilities at Pump Station 4	
Power to filter presses? TBD	

Item 3 – Mid-Point Chlorination

Mid-point chlorination facilities are proposed, including the following principal components:

- Feeders, scales, monitors
- Piping, valves, and controls
- Scrubber
- Ton Containers
- 

Phase 1	Phase 2
Mid-point chlorination	

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Item 4 – Security Measures

Add three additional security cameras to monitor the following areas:

- Chlorine storage area
- Oxygen and Nitrogen storage area
- East side of WTP property

Phase 1	Phase 2
Additional security cameras (by City)	

Item 5 – Low and High Service Pump Station No. 4

As a result of decreased demands, pumps at Pump Station No. 4 are “over-sized” and do not efficiently operate. Some of the pumps experience vibrations in the shafts and steady bearings. The existing pump station will be rehabilitated to replace “over-sized” pumps and obsolete equipment and provide needed maintenance. Proposed work includes:

- 25 mgd Low Service Pump No. 4 – upgrade motor to inverter duty, rehabilitate pump and piping, install new valve, and install new VFD
- 15 mgd Low Service Pump No. 6 – rehabilitate pump shaft and bearings
- Install two new High Service Pumps (15 mgd @190 feet TH, vertically mounted pumps with 800 HP 2400/4160 V inverter duty motors, with 20 feet of shaft and steady bearings)
- Replacement of existing piping, valves, supports, and bearings
- New intermediate platforms, ladders, & stairs
- New ventilation (for exhausting heat from VFD's)
- Install two medium voltage VFD units
- Demolition of existing equipment to accommodate new equipment

Rehabilitation of Pump Station No. 4 is planned to be completed in two phases. A new high service pump and a new low lift pump will be installed initially to provide efficient service during the period when water from the Flint River is treated. Additional high service and low lift pumps will be installed later to provide long-term reliable, efficient service.

Phase 1	Phase 2
Rehabilitate Pump 6 shaft and bearings (by City)	Rehabilitate 25 mgd Low Service Pump No. 4, new motor, new valve, new VFD
New High Service Pump No. 1	New High Service Pump No. 2
Install VFD for Pump No. 1	Install VFD for Pump No. 2
Provide ventilation for Pump No. 1	Provide ventilation for Pump No. 2
Demolition of existing equipment	Demolition of existing equipment

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Item 6 – Filter Transfer Station

Recent changes in regulations, enhanced CT is required. Additional CT can be provided by including the volume of the Dort Reservoir in the process train. However, because of its elevation with respect to other treatment processes, pumping will be required to utilize the reservoir. The proposed pumping facility will provide for the following:

- Three 12 mgd @ 40 ft TH vertical turbine pumps with 150 HP, 480 V inverter duty motors are planned.
- Valves and Controls
- Ventilation and boiler system
- Three low voltage VFD's
- Power feeders
- MEP
- Piping connections
- 200 feet of 30" water main
- 600 feet of 36" water main
- Site work, paving, & utilities

Phase 1	Phase 2
Filter Transfer Pump Station	

Item 7 – SCADA

As new pumps, chemical systems, and controls are installed; instrumentation and monitoring should be provided. It is proposed that the SCADA network is upgraded to current technology and software and training provided in the initial phase.

Phase 1	Phase 2
SCADA Network Upgrade	SCADA Hardware (Phase 2)
Software and Training	
SCADA Hardware (Phase 1)	

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Item 8 – Raw Water Piping Connection

The proposed KWA raw water pipeline will connect to the existing 72" PCCP finished water supply line near Center and Pierson Roads. (East of this connection, the 72" PCCP will be utilized by GCDC-WWS for distribution of finished water in the GCDC-WWS service area.) Raw water from Lake Huron will be conveyed to the WTP site via the 72" PCCP pipeline. On the WTP site, the 72" pipeline will be tapped for a 42" pipe and for a 36" pipe to convey raw water for treatment. The following work is proposed:

- Piping connections – *maybe some exists in ph. 1 instead of 2*
- 900 feet of 42" water main *to avoid having to tap in service lines*
- 100 feet of 36" water main
- Roadway and site restoration
- Storm sewer relocation
- Control valve rehabilitation and replacement

Phase 1	Phase 2
	Raw water piping connections

**3. Other Items to Address to Finalize Scope of Work**

In addition to the upgrades proposed above, the following issues/questions need to be addressed before finalizing the scope of proposed upgrades to the WTP:

- a) Options for handling / disposal of lime sludge from softening operations (during period Flint River is water source)
- b) Requirements for CT and enhanced treatment
- c) Impacts of using river as continuous supply (quantity, quality monitoring & control, reservoir operating levels)
- d) Chemical storage options

Other DEP thoughts:

- S.B. wondering about transition of ~~water~~ supplies.  
DWSB to Flint or KWA, would have some blending
- Future U.V.? Could include in transfer to Detroit for  
~~long term plan~~ long term plan is to make provisions to add, if needed  
in the future  
Dep req's can be in parallel, in series not necessary  
to get crypto credit - has to be Dep approved, extra steps
- S.B. still subject to E.M./state buy off.

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August 20, 2013



Recap:

Ph. 1 .

- Don't out, still need chem tanks
- look at generators
- mid put  $Cl_2$  out
- Pump impr in / good
- Security in
- $\pm 6$  out
- $\pm 7$  stays same
- $\pm 8$

M.P. to send CT #'s / calcs to DWG, cc: Brent

- We will develop plan for short term lime sludge.
- Mid pnt. Cl<sub>2</sub> before filters, even w/out Dort.  
Brent wants something after softening.
- Possible convert Dort to raw storage then.
- Better option seems to be still have transfer sta. & use as finish storage, but not until ph. 2.

- Westech coming 9/10th. - 6 hrs. } 3 Swt  
 - Flot coming with us the 15th. } 5 Westech
- Take the walk before for training.